

Functional Metal-Based Nanomaterials from Metallopolymers

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Organometallic polymers represent an important research field due to their combination of unique and intriguing redox, electronic, magnetic, optical, and catalytic properties and their ability to be easily processed and fabricated into thin films, fibers, and other forms. Modern technology depends on fast, reliable data processing and storage. Hard ferromagnetic (L₁₀-phase) FePt alloy nanoparticles (NPs) with extremely high magnetocrystalline anisotropy are considered to be one of the most promising candidates for the next generation of ultrahigh-density data storage systems. The question of how to generate ordered patterns of L₁₀-FePt NPs and how to transform the technology to the practical application is challenging. As these metallopolymers can be readily shaped and patterned using various lithographic techniques, they offer a convenient synthetic access to patterned arrays of metal NPs with control of their composition and density per unit area. However, many of the most desirable properties are exhibited by metal alloy NPs rather than single-component metal NPs. In this talk, the recent advances in developing new functional organometallic polyene polymers as precursors to magnetic metal alloy nanoparticles and their lithographic patterning studies will be presented. These metallated polymers (both main-chain and side-chain polymers) are promising as building blocks in realizing high-density magnetic data storage media where the convenient and rapid patterning of magnetic NPs is highly desirable. The bottom-up synthesis of functional 2D metallopolymers from molecular precursors will also be presented.

References

1. Liu, K.; Ho, C.-L.; Aouba, S.; Zhao, Y.-Q.; Lu, Z.-H.; Petrov, S.; Coombs, N.; Dube, P.; Ruda, H.E.; Wong, W.-Y.; Manners, I. *Angew. Chem. Int. Ed.* **2008**, *47*, 1255.
2. Dong, Q.; Li, G.; Ho, C.-L.; Faisal, M.; Leung, C.W.; Pong, P.W.-T.; Liu, K.; Tang, B.-Z.; Manners, I.; Wong, W.-Y. *Adv. Mater.* **2012**, *24*, 1034.
3. Dong, Q.; Li, G.; Ho, C.-L.; Leung, C.-W.; Pong, P.W.-T.; Manners, I.; Wong, W.-Y. *Adv. Funct. Mater.* **2014**, *24*, 857.
4. Dong, Q.; Qu, W.; Liang, W.; Guo, K.; Xue, H.; Guo, Y.; Meng, Z.; Ho, C.-L.; Leung, C.-W.; Wong, W.-Y. *Nanoscale* **2016**, *8*, 7068.
5. Meng, Z.; Li, G.; Wong, H.-F.; Ng, S.-M.; Yiu, S.-C.; Ho, C.-L.; Leung, C.-W.; Manners, I.; Wong, W.-Y. *Nanoscale* **2017**, *9*, 731.